

CLAIMS

1. A microfluidic device adapted such that the flow of fluids within the device is controlled by different surfaces of the device having different surface characteristics.
2. A microfluidic device according to claim 1 comprising a substrate whose surface is treated to provide areas having different surface characteristics, said areas being arranged to enable control of the flow of fluids passing across the substrate.
3. A microfluidic device according to ~~either claim 1 or 2~~ ^{claim 1} with the proviso that the substrate is not hydrated oxide material.
4. A microfluidic device according to ~~either claim 2 or 3~~ ^{claim 2} wherein the substrate has a hydrophobic surface interspersed with hydrophilic areas.
5. A microfluidic device according to claim 4 further comprising a second substrate arranged approximately parallel to the first substrate such that fluid entering the device between the substrates will flow along predetermined pathways.
6. A device according to ~~claims 4 or 5~~ ^{claim 4} wherein the plurality of hydrophilic areas is an array of hydrophilic spots.
7. A device according to claim 6 wherein the hydrophilic spots are arranged in lines radiating from a central point on the first substrate.
8. A device according to claim 7 wherein the lines of spots are separated by walls connecting the two substrates.
9. A microfluidic device according to ~~either claim 2 or 3~~ ^{claim 2} wherein the substrate has hydrophobic and hydrophilic surface areas which define a pathway for fluid to travel over the surface in which there is at least one hydrophobic/ hydrophilic interface.
10. A microfluidic device according to claim 1, and having predetermined pathways for fluid flow, the surfaces of such pathways being hydrophilic, in which a valve is formed by a section in a pathway

having a hydrophobic surface.

11. A microfluidic device according to ^{claim 4} ~~any one of claims 4 to 10~~ in which the surface of at least some of the hydrophilic surfaces is treated to enable the culture of cells.
- 5 12. A microfluidic device according to claim 11 which contains gas pathways to enable the access of air to the cell culture.
13. A microfluidic device according to claim 1 wherein the different surface characteristics are defined by different areas of the surface carrying different electrical charges.
- 10 14. A microfluidic device according to claim 13 wherein means are provided for changing the charge on the surface to alter the fluid pathway.
- 15 15. A microfluidic device according to claim 1 wherein the different surface characteristics are defined by different areas of the surface being differently magnetised.
16. A microfluidic device according to claim 15 wherein means are provided for changing the magnetisation of the surface to alter the fluid pathway.
17. A microfluidic device according to ^{claim 1} ~~any of the previous claims~~ which is circular.
- 20 18. A microfluidic device according to claim 17 which is adapted for rotation of the device.
19. A microfluidic device according to ^{claim 17} ~~either one of claims 17 or 18~~ which has an inlet for fluids towards the centre of the device and an annular outlet for fluids towards the circumference of the device.

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